

WASTE MANAGEMENT SpecFUEL

40 CFR 241 - Comparison of Antimony and Fluoride

INTRODUCTION

WM submitted in March 2012 a request for a comfort letter determination that SpecFUEL is a non-waste fuel. WM's submission included a comparison of contaminants, as defined in 40 CFR 241.2, in SpecFUEL to traditional fuels (coal, wood, fuel oil and pet coke). EPA has requested that WM further review antimony and fluoride.

Antimony Comparison

Table 1. Comparison of Metals in SpecFUEL to Coal

| | SpecFuel Sample Results | | | Coal | | | | | |
|---|-------------------------|--------------|---------------|---------------------------------------|--|---------------|----------------------------------|--|---------------|
| | Volatility ** | Average | Range High | Literary Sources ¹ High | OAQPS Database ¹ Average | Range High | EPA Letter ² Value | USGS Coal Database ³ Average | Range High |
| | | | | | | | | | |
| | | | | | | | | | |
| Components | | | | | | | | | |
| Metals (mg/kg) | | | | | | | | | |
| Antimony (HAP) | low | 29.1 | | | 1.7 | | 11.1 | 1.23 | |
| | | | 51.4 | 10 | | 6.9 | | | 70 |
| Arsenic (HAP) | low | 0.61 | 0.61 | 80 | 8.2 | 174 | 8 | 24.55 | 2200 |
| Beryllium (HAP) | low | -- | -- | 15 | 1.9 | 206 | 1.353 | 2.13 | 18 |
| Cadmium (HAP) | semi | 0.60 | 1.37 | 3 | 0.6 | 19 | 1.131 | 0.41 | 160 |
| Chromium (HAP) | low | 15.17 | 20.6 | 60 | 13.4 | 168 | 15.7 | 14.02 | 200 |
| Cobalt (HAP) | low | 1.09 | 1.38 | 30 | 6.9 | 25.2 | 6.512 | 5.85 | 180 |
| Lead (HAP) | semi | 21.69 | 45.0 | 80 | 8.7 | 148 | 14 | 10.51 | 1900 |
| Manganese (HAP) | low | 38.49 | 47.2 | 300 | 26.2 | 512 | 132 | 41.38 | 2500 |
| Mercury (HAP) | volatile | 0.20 | 0.28 | 1 | 0.09 | 3.1 | 2 | 0.18 | 63 |
| Nickel (HAP) | low | 2.86 | 7.24 | 50 | 21.5 | 730 | 15.4 | 14.76 | 280 |
| Selenium (HAP) | semi | 1.15 | 1.28 | 10 | 3.4 | 74.3 | 2.2 | 2.87 | 150 |
| Low-Volatile Metals (mg/kg) | | 87.3 | | | 79.8 | | 190.1 | 103.9 | |
| Low-Volatile Metals (mg/kg) | | | 128 | 545 | | 1822 | | | 5448 |
| Total Metals (mg/kg) | | 110.9 | | | 92.6 | | 209.4 | 117.9 | |
| Total Metals (mg/kg) | | | 176.4 | 639 | | 2067 | | | 7721 |
| * All 90% UPL Results reported as Normal -- = Non-Detect n.d. = No Data ** volatility based on 40 CFR 63.1219 | | | | | | | | | |
| Resources: 1: EPA Letter "Contaminant Concentrations in Traditional Fuels: Tables for Comparison." November 29, 2011. 2: EPA Letter to Joseph Knapik- International Paper Products Corporation, October 5, 2011. 3: USGS Coal Database; http://energy.er.usgs.gov/coalqual.htm | | | | | | | | | |

We compared SpecFUEL to three references of coal content information as noted in the table above. Comparisons were made of antimony alone and as a component of the standard groupings of low-volatile metals and total metals. We based our comparisons on the

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recommendations in the Agency's December 23, 2011 NHSM preamble (FR Vol 76, No. 247) as cited below.

The existing language provides flexibility for persons to make comparisons on a contaminant by- contaminant basis or on a group of contaminants-by-group of contaminants basis in determining what constituents to compare.
(FR Vol. 76, No. 247, pg. 80471)

While persons may satisfy the contaminant legitimacy criterion on a contaminant-by-contaminant basis, comparing groups of contaminants in the NHSM to similar groups in traditional fuels could also be appropriate, provided the grouped contaminants share physical and chemical properties that influence behavior in the combustion unit prior to the point where emissions occur. Volatility, the presence of specific elements, and compound structure are three such properties.
(FR Vol. 76, No. 247, pg. 80477)

...as it allows a person with a unit that can or does burn similar traditional fuels (e.g., anthracite, lignite, bituminous, and sub-bituminous coal) to group those traditional fuels when making contaminant comparisons."
(FR Vol. 76, No. 247, pg. 80477)

Following the Agency's guidance, we compared groupings of low-volatile metals and total metals. See 40 CFR 63.1219(e) (4): ("...low volatile metal feedrate limits apply to arsenic, beryllium, chromium, antimony, cobalt, manganese, and nickel, combined.").

We reviewed references for coal from the EPA OAQPS data (note that EPA OAQPS provided data from other literary sources and their own database posted by EPA-OSWER November 29, 2011), the EPA comfort letter issued to IPP and the USGS coal database (<http://energy.er.usgs.gov/coalqual.htm>)

Antimony Comparison Results

Table 1 shows that SpecFUEL antimony content averaged 29.1 mg/Kg with a high value of 51.40. The three reference source averages for coal ranged from 1.23 to 11.1 mg/Kg, while high values ranged from 6.9 to 70 mg/Kg. Given the high value of coal in the USGS database (70 mg/Kg) is greater than the high value of SpecFUEL (51.4 mg/Kg); we believe that the SpecFUEL antimony content is comparable.

Low-volatile metals comparison: Table 1 shows that the sum of average concentrations in SpecFUEL is 87.3 mg/Kg, while the sum of coal averages across the three coal references are 79.8, 103.9, and 190.1 mg/Kg. The sum of high concentrations in SpecFUEL is 128 mg/Kg while the sum of coal reference high concentrations are 545, 1822 and 5448 mg/Kg. We therefore found the concentration of low-volatile metals in SpecFUEL to be comparable to coal looking at both the average and high concentrations.

Total metals comparison: Table 1 shows that sum of average concentrations in SpecFUEL is 110.9 mg/Kg while the sum of coal averages are 92.6, 117.7, and 209.4 mg/Kg. The sum of high concentrations in SpecFUEL is 176.4 mg/Kg while the sum of coal high concentrations are 639, 2067 and 7721 mg/Kg. Therefore, total metals concentrations in SpecFUEL are comparable to coal for both the average and high concentrations.

Antimony compared to Wood and Biomass Materials

Table 2. below summarizes the comparison of metals within SpecFUEL to wood and biomass materials.

| SpecFuel Sample Results | | | | Wood and Biomass Materials | | | |
|--|----------|-------|-------------------------------|-----------------------------|-------------------------|-------|------|
| | | Range | Literary Sources ¹ | OAQPS Database ¹ | EPA Letter ² | | |
| | | | Range | | Range | Value | |
| Volatility ** | Average | High | High | Average | High | | |
| Components | | | | | | | |
| Metals (mg/kg) | | | | | | | |
| Antimony (HAP) | low | 29.1 | | 0.9 | | 0.375 | |
| | | | 51.4 | 26 | 6 | | |
| Arsenic (HAP) | low | 0.61 | 0.61 | 6.8 | 6.3 | 298 | 21 |
| Beryllium (HAP) | low | -- | -- | -- | 0.3 | 10 | 32 |
| Cadmium (HAP) | semi | 0.60 | 1.37 | 3 | 0.6 | 17 | 8 |
| Chromium (HAP) | low | 15.17 | 20.6 | 130 | 5.9 | 340 | 62 |
| Cobalt (HAP) | low | 1.09 | 1.38 | 24 | 6.5 | 213 | 24 |
| Lead (HAP) | semi | 21.69 | 45.0 | 340 | 4.5 | 229 | 38 |
| Manganese (HAP) | low | 38.49 | 47.2 | 840 | 302 | 15800 | 6100 |
| Mercury (HAP) | volatile | 0.20 | 0.28 | 0.2 | 0.03 | 1.1 | 2 |
| Nickel (HAP) | low | 2.86 | 7.24 | 540 | 2.8 | 175 | 51 |
| Selenium (HAP) | semi | 1.15 | 1.28 | 2 | 1.1 | 9 | 66 |
| Low-Volatile Metals (mg/kg) | | 87.3 | | | 324.7 | | 6290 |
| Low-Volatile Metals (mg/kg) | | | 128 | 1567 | | 16842 | |
| Total Metals (mg/kg) | | 110.9 | | | 330 | | 6338 |
| Total Metals (mg/kg) | | | 176.4 | 1912 | | 17098 | |
| * All 90% UPL Results reported as Normal | | | | | | | |
| -- = Non-Detect | | | | | | | |
| n.d. = No Data | | | | | | | |
| ** volatility based on 40 CFR 63.1219 | | | | | | | |
| Resources: | | | | | | | |
| 1: EPA Letter "Contaminant Concentrations in Traditional Fuels: Tables for Comparison." November 29, 2011. | | | | | | | |
| 2: EPA Letter to Joseph Knapik- International Paper Products Corporation. October 5, 2011. | | | | | | | |

Antimony Comparison to Wood and Biomass - Results

Table 2 shows that SpecFUEL antimony concentrations averaged 29.1 mg/Kg with a high value of 51.40. The reference source averages ranged from 0.375 to 0.9 mg/Kg, and the high values

ranged from 6 to 26 mg/Kg. While the high value of SpecFUEL is above the high value of wood and biomass, the low-volatility metals and total metals comparisons are comparable.

Low-volatile metals: Table 2 shows that the sum of average concentrations in SpecFUEL is 87.3 mg/Kg, while the sum of wood and biomass averages are 324.7 and 6290 mg/Kg. The sum of high concentrations in SpecFUEL is 128 mg/Kg, while the sum of wood and biomass high concentrations are 1567 and 16,842 mg/Kg. Therefore, SpecFUEL low-volatile metal concentrations (both average and high concentrations) are comparable to wood and biomass.

Total metals: Table 2 shows that sum of average concentrations in SpecFUEL is 110.9 mg/Kg while the sum of wood averages are 330 and 6338 mg/Kg. The sum of high concentrations in SpecFUEL is 176.4 mg/Kg while the sum of wood high concentrations are 1912 and 17,098 mg/Kg. Therefore, SpecFUEL is comparable on the average and high concentrations to wood.

Antimony compared to Pet Coke

We were unable to compare SpecFUEL antimony concentrations to those of petroleum coke because EPA does not provide comparison data of petroleum coke.

Fluoride Comparisons

Table 3. Comparison of fluoride in SpecFUEL to Coal

| | SpecFuel Sample Results | | Coal | | | | | |
|--|-------------------------|-------------|-------------------------------|-----------------------------|-------------|-------------------------|---------------------------------|--------------|
| | | | Literary Sources ³ | OAQPS Database ¹ | | EPA Letter ² | USGS Coal Database ³ | |
| | Range | | High | Average | High | Value | Average | High |
| | Average | High | | | | | | |
| Components | | | | | | | | |
| Ions | | | | | | | | |
| Bromide (mg/kg) | 6.27 | 6.80 | n.d. | n.d. | n.d. | n.d. | 18.6 | 160 |
| Chloride (mg/kg) | 2033 | 2250 | n.d. | 992 | 9080 | 1440 | 573.3 | 8800 |
| Fluoride (mg/kg) | 892 | | | 64 | | 160 | | 4900 |
| | | 1070 | n.d. | | 178 | | 96.5 | |
| Total Halogens (mg/kg) | 2931 | 3327 | -- | 1056 | 9258 | 1600 | 688 | 13860 |
| * All 90% UPL Results reported as Normal ** volatility based on 40 CFR 63.1219 | | | | | | | | |
| -- = Non-Detect | | | | | | | | |
| n.d. = No Data | | | | | | | | |
| Resources: | | | | | | | | |
| 1: EPA Letter "Contaminant Concentrations in Traditional Fuels: Tables for Comparison." November 29, 2011. | | | | | | | | |
| 2: EPA Letter to Joseph Knapik- International Paper Products Corporation. October 5, 2011. | | | | | | | | |
| 3: USGS Coal Database; http://energy.er.usgs.gov/coalqual.htm | | | | | | | | |

Fluoride compared to Coal - Results

Table 3 shows the average concentration of fluoride in SpecFUEL is 892 mg/Kg with a high value of 1070 mg/Kg, while the coal reference averages are 96.5 and 178 mg/Kg. While the high value of SpecFUEL is above the high value of coal, total halides comparisons are comparable as shown below.

Total halides: Table 3 shows that the sum of average concentrations in SpecFUEL is 2931 mg/Kg while the sum of coal averages are 688 and 1056 mg/Kg. The sum of high concentrations in SpecFUEL is 3327 mg/Kg while the sum of coal high concentrations are 9258 and 13,860 mg/Kg. Based on a comparison of high concentrations for total halides, we believe SpecFUEL is comparable to coal.

Fluoride compared to Wood and Biomass Materials

Table 4. Comparison of fluoride in SpecFUEL to wood and biomass materials (wood)

| | SpecFuel Sample Results | | Wood and Biomass Materials | | | |
|---|-------------------------|-------------|-------------------------------|-----------------------------|-------------|-------------------------|
| | | | Literary Sources ¹ | OAQPS Database ¹ | | EPA Letter ² |
| | Average | Range | Range | Average | Range | Value |
| Components | | | | | | |
| Ions | | | | | | |
| Bromide (mg/kg) | 6.27 | 6.80 | n.d. | n.d. | n.d. | n.d. |
| Chloride (mg/kg) | 2033 | 2250 | 2600 | 259 | 5400 | 1600 |
| Fluoride (mg/kg) | 892 | | | 32.4 | | 490 |
| | | 1070 | 300 | | 128 | |
| Total Halogens (mg/kg) | 2931 | 3327 | 2900 | 291 | 5528 | 2090.0 |
| * All 90% UPL Results reported as Normal ** volatility based on 40 CFR 63.1219 -- = Non-Detect n.d. = No Data | | | | | | |
| Resources: 1: EPA Letter "Contaminant Concentrations in Traditional Fuels: Tables for Comparison." November 29, 2011. 2: EPA Letter to Joseph Knapik- International Paper Products Corporation. October 5, 2011. | | | | | | |

Fluoride compared to Wood - Results

Table 4 shows the average fluoride concentration in SpecFUEL is 892 mg/Kg, while the wood reference averages are 32.8 and 490 mg/Kg. As was the case with coal, the total halides comparisons between SpecFUEL and wood are comparable. Table 4 shows that the sum of average concentrations for total halides in SpecFUEL is 2931 mg/Kg while the sum of average concentrations of total halides in wood are 291 and 2090 mg/Kg for the EPA references. The sum of high concentrations in SpecFUEL is 3327 mg/Kg, and the sum of high concentrations in wood are 2900 and 5528 mg/Kg. Therefore, SpecFUEL total halides concentrations are comparable to those in the wood references.

SUMMARY

Following Agency guidance, we found SpecFUEL concentrations of low-volatile metals, total metals and total halides to be comparable to coal and wood.

